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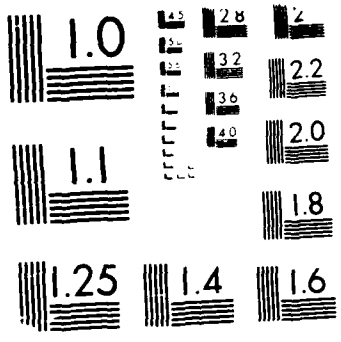

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A powerful new image processing system consisting of a MicroVAX II and a Megavision image processor was purchased by the Big Bear Solar Observatory. The system has been immensely successful, and a number of important research projects have already been carried out with it.

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An Image Processing System for Research in Solar Physics

FINAL TECHNICAL REPORT
Grant No. AFOSR-86-0300

Inclusive Period of Performance:
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Principal Investigator: Harold Zirin

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Performing Organization: Office of Sponsored Research
California Institute of Technology
Pasadena, CA 91125

Final Technical Report

AFOSR-86-0300

This grant was to provide a new image processing system for the Big Bear Solar Observatory. The funds were used to purchase a MicroVAX II, associated peripheral equipment including a 6250 bpi tape drive and disk drive, extended memory and multiple ports for the computer. In addition, a MegaVision Image Processing System was purchased. Because of the competitive nature of the computer business at this time, it was possible obtain some of the hardware at lower prices than expected, and remaining funds were used to increase the capability of the system above that additionally envisioned. The assembly and debugging of the new computer was carried out by members of the Big Bear staff. This produced a considerable cost saving over a turnkey system. However, severe difficulties were experienced with the first disk drive purchased, a Fujitsu Super Eagle. After three different drives were installed and all failed, the Super Eagle was returned and a normal Fujitsu Eagle drive was purchased. A second Fujitsu Eagle drive was purchased with funds from another grant.

The new image processing system has transformed the scientific program of the Big Bear Observatory. It is so powerful that many new problems may be addressed. In particular we have developed new software to carry out shift and add processing of high-resolution videotapes of the sun. Programs were written which can take three or four hundred solar images and reregister them automatically in sequence so that one removes the image shake produced by normal seeing. This can be set up to start running at night and then in the morning the data has been aligned. We also went through our videotapes of granulation and sunspots, selected out the best frames and superposed them. This is the technique called "shift and add" in the speckle interferometry business.

In addition, considerable use of the new system has been made in our work on radio mapping, in analyzing the motion of magnetic elements on the surface of the sun, and producing highly accelerated movies of small magnetic elements around sunspots.

Thus the system has completely fulfilled our expectations and is producing an effect on our science output completely disproportionate to its cost. We are grateful to the AFOSR for having permitted this step forward in our capability. Although this is not a large computer system, we feel it is better than virtually any system at any observatory

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